National Institute of Environmental Health Sciences

Influence of environmental factors on the presence of Vibrio cholerae in the marine environment: A climate link

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Abstract:

Evidence indicates that the atmospheric and oceanic processes that occur in response to increased greenhouse gases in the broad-scale climate system may already be changing the ecology of infectious diseases. Recent studies have shown that climate also influences the abundance and ecology of pathogens, and the links between pathogens and changing ocean conditions, including human diseases such as cholera. Vibrio cholerae is well recognized as being responsible for significant mortality and economic loss in developing countries, most often centered in tropical areas of the world. Within the marine environment, V. cholerae is found attached to surfaces provided by plants, filamentous green algae, copepods, crustaceans, and insects. The specific environmental changes that amplified plankton and associated bacterial proliferation and govern the location and timing of plankton blooms have been elucidated. Several studies have demonstrated that environmental non-O1 and non-O139 V. cholerae strains and V. cholerae O1 El Tor and O139 are able to form a three-dimensional biofilm on surfaces which provides a microenvironment, facilitating environmental persistence within natural aquatic habitats during interepidemic periods. Revealing the influence of climatic/environmental factors in seasonal patterns is critical to understanding temporal variability of cholera at longer time scales to improve disease forecasting. From an applied perspective, clarifying the mechanisms that link seasonal environmental changes to diseases' dynamics will aid in developing strategies for controlling diseases across a range of human and natural systems.

Source: http://www.jidc.org/index.php/journal/article/view/19734600
http://www.ncbi.nlm.nih.gov/pubmed/19734600

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Extreme Weather Event, Food/Water Quality, Food/Water Quality, Food/Water Security, Meteorological Factors, Precipitation, Sea Level Rise, Solar Radiation, Temperature, Other Exposure

Extreme Weather Event: Drought, Flooding

Food/Water Quality: Biotoxin/Algal Bloom, Chemical, Pathogen, Pathogen, Other Water Quality Issue

Water Quality (other): Nutrients; Eutrophication; Salinity; pH; Sea surface temperature; Turbidity;

Chlorophyll a

Food/Water Security: Fisheries

Temperature: Extreme Cold, Fluctuations

Other Exposure: Ocean circulation

Geographic Feature:

resource focuses on specific type of geography

Ocean/Coastal

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact:

specification of health effect or disease related to climate change exposure

Infectious Disease, Morbidity/Mortality

Infectious Disease: Airborne Disease, Foodborne/Waterborne Disease, Vectorborne Disease

Airborne Disease: General Airborne Disease

Foodborne/Waterborne Disease: Cholera, General Foodborne/Waterborne Disease

Vectorborne Disease: General Vectorborne

Resource Type:

format or standard characteristic of resource

Review

Timescale:

time period studied

Time Scale Unspecified